

REMARKS/ARGUMENTS

Claims 1 – 9 are presented for reconsideration and further examination in view of the foregoing amendments and following remarks.

In the outstanding Office Action, the Examiner rejected claims 1 – 9 under 35 U.S.C. §112, first paragraph as failing to comply with the written description requirement; rejected claims 1 and 5 – 9 under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 3,585,723 to Simor (hereinafter referred to as “the Simor ‘723 patent; and rejected claims 2 – 4 under 35 U.S.C. §103(a) as being unpatentable over the Simor ‘723 patent in view of U.S. Patent No. 6,186,790 to Karmaker et al. (hereinafter referred to as “the Karmaker et al. ‘790 patent”).

By this Response and Amendment, claim 1 has been amended and, as amended, the rejections to claim 1 and the rejections to the claims dependent thereon are traversed.

Support for the amendment to claim 1 can be found on page three of the originally filed application: “[t]he crown of the present invention is characterized by... excellent dimensional stability and sufficient resilience...” and on page four: “[d]ue to the resilience of the depending side surfaces 14, the action of the ejector 26 is able to disengage the internal mold element 32...” Therefore, it is respectfully submitted that the above amendments do not introduce any new matter, within the meaning of 35 U.S.C. §132, to this application.

Interview

Applicant thanks the Examiner for the Interview of August 7, 2007 with Applicant and Applicant’s representative. Applicant understands that the Examiner believes that the claims are not explicit enough with respect to recitation of the term “thermoplastic.” To summarize the interview, the Applicant explained that the Simor reference does not include an elastically thermoplastic

material. He also opined that the Simor '723 patent discloses a dental crown that is plastically deformable whereas the crown of the present claimed subject matter is elastically deformable, i.e., the crown resumes its initial shape after being fitted onto a patient's dentition.

Specification Objection

The Examiner objected to the addition of "bent portion 15 and relief 17 on an inner surface that corresponds to a bent portion" in the disclosure as new matter.

Response

By this Response and Amendment, the specification has been amended to remove these features. As such, Applicant submits that the objection to the specification has been obviated. Accordingly, Applicant respectfully requests that the Examiner reconsider and withdraw the rejection.

Drawings

The Examiner objected to the drawings for including new matter.

Response

By this Response and Amendment, the drawings have been amended to remove the features noted by the Examiner. Accordingly, Applicant respectfully requests that the Examiner reconsider and withdraw the objection to the drawings.

Claim Rejection Under 35 U.S.C. §112, First Paragraph

The Examiner rejected claims 1 – 9 as new matter for recitation of the phrase “at least one of said depending flexible side surfaces having a relief on its inner surface corresponding to a bent portion.”

Response

Applicant submits that this feature is not new matter; however, to hasten prosecution in this case, Applicant has removed this feature from the claim. Accordingly, Applicant respectfully requests that the Examiner reconsider and withdraw the rejection.

Prior Art Rejections

The Examiner rejected claims 1 and 5 – 9 as being anticipated by the Simor ‘723 patent. And, the Examiner rejected claims 2 – 4 under 35 U.S.C. §103(a) as being unpatentable over the Simor ‘723 patent in view of the Karmaker et al. ‘790 patent.

Response

By this Response and Amendment, independent claim 1 has been amended and, as amended, the rejections thereto are traversed since all of the features of amended independent claim 1 are not present in the cited prior art.

For a reference to anticipate an invention, all of the elements of that invention must be present in the reference. The test for anticipation under section 102 is whether each and every element as set forth in the claim is found, either expressly or inherently, in a single prior art reference. *Verdegaal Bros. v. Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987);

MPEP §2131.

To establish a *prima facie* case of obviousness, the Examiner must establish that the prior art references teach or suggest all of the claim limitations. *Amgen, Inc. v. Chugai Pharm. Co.*, 18 USPQ2d 1016, 1023 (Fed. Cir. 1991); *In re Fine*, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988); *In re Wilson*, 165 USPQ 494, 496 (CCPA 1970).

The Inventive Subject Matter

The inventive subject matter relates to a dental crown which is configured for treatment of primary teeth and permanent molars and which is made of a thermoplastic polymer material. Amended independent claim 1 recites: "...wherein said dental crown is formed of a resilient and dimensionally stable thermoplastic material such that said dental crown returns to its original shape upon being applied to and removed from a patient's dentition." The crown is made of very flexible materials and no changes of the original contour will be observed after placement of the crown. The crown configuration eliminates a need to adjust its margins to the tooth margins, with no possibility to change occlusal morphology using hand instruments.

It is clear from the description and illustration in the present patent application that the dental crown is a single-layer structure made of a thermoplastic polymer material. In fact, Figs. 1 and 2 show a dental crown of the inventive subject matter in perspective and sectional views – see for example page 2, first paragraph of the Detailed Description.

The single-layer crown shown in Figs. 1 and 2 "may readily be mounted, by conventional methods, such as through the use of dental cement in the mouth of a patient, typically a child, as part of treatment of primary teeth and permanent molars having extensive carious lesions" – see page 2, Detailed Description, third paragraph, third sentence.

An explanation of the history and development of the inventive subject matter, as discussed during the August 7, 2007 interview, might help the Examiner's understanding.

Development of the Inventive Subject Matter

For the treatment of permanent teeth, a crown of the tooth is reduced significantly on all its surfaces. The final configuration resembles a cylinder that all four walls converge slightly from the gingival aspect to the occlusal surface (the masticatory surface). In order to prepare the final crown an impression of the prepared tooth is taken and sent to a dental laboratory. The crown for the permanent tooth is prepared individually for each tooth. The final crown is prepared so that its internal surface is very close in its geometry (dimensions and shape) to the outer configuration of the prepared tooth. The retention of the crown to the tooth is based on vacuum formation between two almost identical cylinders.

The preparation of the primary (deciduous) molar for crowns differs significantly from that of a permanent tooth, and accordingly the crown design is different. When treating primary teeth, the relatively long time needed for the tooth preparation and the short time that a small child can sit in the dental chair should be taken into consideration. The idea of using the prefabricated crowns was aimed at minimally preparing the primary molars in order to shorten the time, and to use other retentive methods for keeping the crown on the tooth.

The preparation of the tooth is derived from the mechanical properties of retention of the crown. Primary molars have large bulges on the facial and lingual surfaces close to the gingiva. These bulges can be used as retentive mechanisms for the crown. The marginal aspect of the crown has to be flexible in order to jump over these bulges and has to be directed inwardly so that after the jump the margins will fit closely with the crown surfaces.

Preparation of the primary molars differs from that of permanent tooth. Accordingly, mainly

reduced were the height of the tooth crown, the mesial and distal surfaces (surfaces close to the adjacent teeth), while the bulges on the facial and lingual surfaces were kept intact. The preformed crowns have the external surface similar to the primary molars. The crown is thin and prepared from a flexible material. Before the final adaptation of the crown, the crown is filled with cement and is placed over the tooth using a "snap-fit" procedure.

It should be understood that a cement layer between the crown and the tooth used for gluing the crown to the tooth in a snap-fit procedure mainly fills the minimal gap between the crown and the tooth and prevents saliva and food particles to enter between the crown and the tooth. It is not part of the crown and it should be kept to minimum. According to the conventional procedure of mounting a crown on a permanent tooth, a cement layer has a thickness not exceeding 0.3 mm, while the minimal required thickness of the crown is of the order of two millimeters or so. Generally, in the conventional procedure for permanent teeth, the cement layer is always much thinner than the crown thickness, and the cement layer thus is not a part of the crown.

Thus, the crown of the present invention has a single-layer structure made of a thermoplastic polymer material configured to be directly mountable onto a tooth and being formed by a tooth shape top surface and a flexible depending side surfaces extending from said tooth shape top surface, the bottom portion of at least one of the flexible depending side surfaces has an inner surface shaped with an undercut defining the inwardly directed bottom portion. The provision of the undercut in the bottom portion of the inner surface of the flexible side surface(s) is aimed at enabling adjustment of the bottom portion of a crown to the specifically prepared tooth shape and preventing falling of the crown from the tooth.

Prior Art

The Simor '723 patent has been cited against the present claims and the Karmaker et al. '790 patent, which discloses structural components for dental appliances that are comprised of a polymeric matrix and further discloses that uses for the structural components include crowns, has been used as a secondary reference.

The Simor '723 patent discloses a dental crown including an occlusal surface and a sidewall that tapers in cross section toward a restricted opening at the cervix. From the figures of the Simor '723 patent, it appears that the wall begins tapering at the top portion of the tooth. The Simor '723 patent is directed toward a temporary crown for a permanent dentition. The crown is made of a metal material, *see The Simor '723 Patent* at col. 4, line 69 – 74. Although the possibility of using plastics is mentioned in the Simor '723 patent, various features of the crown disclosed in the patent and being essential for the technique disclosed and claimed in this patent show that plastics will make the crown inoperable for its intended use. In this connection, Applicant notes col. 6, lines 11 – 14 of the Simor '723 patent, which describes the procedure of changing occlusal configuration of the crown using hand instruments by pressure, which cannot be performed on plastics; and Applicant further notes col. 3, lines 37 – 39, which describes the procedure of burnishing of the cervical edge of the crown, which can be performed only with malleable metals such as a metal.

The technique of the Simor '723 patent utilizes a metal material (thin metal cup) for preparing temporary crowns for permanent teeth. It is clear from the description and illustrations in the Simor '723 patent that various features of the crown essential for the technique of the Simor '723 patent can be achieved only with metals and not plastics. In this connection, the Examiner's attention should be drawn to col. 6 lines 11 – 14 describing the procedure of expansion of the cervix, which cannot be obtained using plastic materials; to col. 3 lines 48 – 50 describing the procedure of

changing occlusal configuration of the crown using hand instruments by pressure, which cannot be performed on plastics; and to col. 3 lines 37 – 39 describing the procedure of burnishing of the cervical edge of the crown, which can be performed only with malleable metals.

According to the technique of the Simor '723 patent, the tooth is prepared for conventional permanent crowns, where all walls converge from the gingiva to the occlusal surface (see Figs. 8-16). The metal cap can be altered by the dentist in order to make it fit the tooth (col. 1, 48 – 52). It is made from a deformable material (col. 4, 73 – 74). The final adaptation is made by closing the opposite teeth and by that changing the height, width and shape of the occlusal surface of the cup.

The outer divergent surfaces of this metal crown do not allow a mechanical retention on the tooth, as in primary molars, but uses cement as the material that causes the internal surface of the crown to become cylindrical and to create the vacuum needed for the retention of the crown on permanent teeth. The material is not flexible since it does not have to jump over bulges, and it can only change configuration on the marginal surface while been pushed downward, because the metal shell is very thin.

On the contrary, the thermoplastic polymer (acetal) crown of the present invention is configured mainly for restoration of primary molars, where the retention of the crown on the tooth is obtained by the mechanical retention under the facial and lingual molar bulges. The margins of the crown have to be able to jump over the bulges, to expand during the snap-fit and to return to the original dimension in order to fit the surfaces of the tooth bellow the bulges. Therefore the surfaces have to be flexible and to bend inwardly at the cervical margins of the crown. The cement has no retentive purposes as in the Simor '723 patent, and it is not intended to become part of the crown in order to help in the retention of the crown.

Therefore, in contrast to the presently claimed subject matter, the cited prior art references,

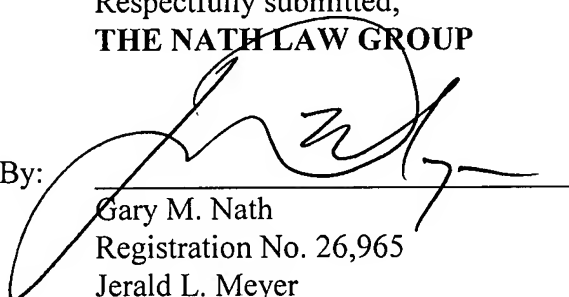
taken alone or in combination with each other, do not disclose, teach or suggest a crown that "...is formed of a resilient and dimensionally stable thermoplastic material such that said dental crown returns to its original shape upon being applied to and removed from a patient's dentition" as recited in independent claim 1. As such, independent claim 1 is asserted to be patentable over the cited prior art references. Similarly, as dependent claims necessarily contain all of the features of the independent claim from which they depend, claims 2 – 9 are asserted to be patentable over the cited prior art for at least the reason that they depend from claim 1. Accordingly, Applicant respectfully requests that the Examiner reconsider and withdraw the rejection under 35 U.S.C. §102(b).

CONCLUSION

In light of the foregoing, Applicant submits that the application is now in condition for allowance. If the Examiner believes the application is not in condition for allowance, Applicant respectfully requests that the Examiner contact the undersigned attorney if it is believed that such contact will expedite the prosecution of the application.

In the event this paper is not timely filed, Applicant petitions for an appropriate extension of time. Please charge any fee deficiency or credit any overpayment to Deposit Account No. 14-0112.

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APPENDIX

Appl. No. 10/685,803
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APPENDIX